DV Qualifiers cloded by TH in database 2/3/17

CETIFICATION

SDG No:

MC49206

Humacao, PR

Laboratory:

Accutest, Massachusetts

Site:

BMS, Building 5 Area, PR

Matrix:

Groundwater

SUMMARY:

Groundwater samples (Table 1) were collected on the BMSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were collected December 15 - 19, 2016 and were analyzed in Accutest Laboratory of Marlborough, Massachusetts that reported the data under SDG No.: MC49206. Results were validated using the following quality control criteria of the methods employed (MADEP VPH and MAPED EPH, Massachusets Department of Environmental Protection, 2004) and the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49206-1	S-42D	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-2	S-43D	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-3	FB121516	AQ - Field Blank Water	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-4	S-31R (2)	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-4D	S-31R (2) MSD	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-4S	S-31R (2) MS	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-5	S-29R	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-6	S-30	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-7	S-38	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-8	MW-11	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-9	EB121616	AQ - Equipment Blank	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-10	FB121616	AQ - Field Blank Water	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49206-11	EB121916	AQ - Equipment Blank	Volatiles TPHC Ranges
			Extractable TPHC Ranges

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49206-12	MW-9	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49206-13	MW-5	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges

Méndez IC # 188

600863

Reviewer Name:

Rafael Infante

Chemist License 1888

Signature:

Date:

January 21, 2017

Report of Analysis

Page 1 of 1

Client Sample ID: S-42D

Lab Sample ID:

MC49206-1

Matrix: Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16

Date Received: 12/20/16

Percent Solids: n/a

File ID DF Analyzed By Prep Date Prep Batch Analytical Batch WX78442.D Run #1 1 12/22/16 AF n/a n/a GWX3885

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

Volatile TPHC Ranges

CAS No. Compound Result RL MDL Units Q C5- C8 Aliphatics (Unadj.) 20.7 50 8.8 ug/I Ī C9- C12 Aliphatics (Unadj.) 9.1 50 8.0 ug/l JB C9- C10 Aromatics (Unadj.) 10.7 50 9.7 ug/l JB C5- C8 Aliphatics 20.4 50 8.8 ug/l J C9- C12 Aliphatics ND 50 8.0 ug/l

CAS No. Surrogate Recoveries Run#1 Run#2 Limits

> 2.3.4-Trifluorotoluene 79% 70-130% 2,3,4-Trifluorotoluene 93% 70-130%





E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID: S-42D

Lab Sample ID:

MC49206-1

Matrix: Method: AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/15/16 Date Received: 12/20/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

File ID DF Analyzed Run #1 DE16615.D 1 01/04/17

Ву TA Prep Date 12/29/16

Prep Batch OP49337

Analytical Batch

GDE925

Run #2

Initial Volume 960 ml

Final Volume 2.0 ml

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	47.6	100	30	ug/l	JB
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	47.6	100	30	ug/l	JB
CAS No	Surrogate Recoveries	Run# 1	Run# 2	Lim	ite	

Surrogate Recoveries	Run# 1	Run# 2	Limits
o-Terphenyl	78%		40-140%
2-Fluorobiphenyl	80%		40-140%
1-Chlorooctadecane	56%		40-140%
2-Bromonaphthalene	79%		40-140%
	o-Terphenyl 2-Fluorobiphenyl 1-Chlorooctadecane	o-Terphenyl 78% 2-Fluorobiphenyl 80% 1-Chlorooctadecane 56%	o-Terphenyl 78% 2-Fluorobiphenyl 80% 1-Chlorooctadecane 56%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-43D

Lab Sample ID:

MC49206-2

Matrix:

AO - Ground Water

MADEP VPH REV 1.1

DF

1

Date Sampled: 12/15/16 Date Received: 12/20/16

Percent Solids: n/a

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1 Run #2 File ID WX78441.D Analyzed 12/22/16

By AF

RL

50

50

50

50

50

Prep Date n/a

MDL

8.8

8.0

9.7

8.8

8.0

Units

ug/l

ug/l

ug/l

ug/l

ug/l

Prep Batch n/a

Q

В

JB

J

J

Analytical Batch

GWX3885

Purge Volume 5.0 ml

Run #1 Run #2

Volatile TPHC Ranges

CAS No. Compound

C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics

C9- C12 Aliphatics CAS No. Surrogate Recoveries

> 2.3.4-Trifluorotoluene 2,3,4-Trifluorotoluene

Run#1

Result

41.0

50.1

27.6

29.3

21.7

80%

94%

Run#2

Limits 70-130%

70-130%

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ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

By

TA

Page 1 of 1

Client Sample ID: S-43D

Lab Sample ID:

MC49206-2

Matrix: Method: AO - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/15/16

Date Received: 12/20/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

File ID DF DE16616.D Run #1 1

Analyzed 01/04/17

Prep Date 12/29/16

Prep Batch OP49337

JΒ

ug/l

Analytical Batch

GDE925

Run #2

Run #1

Run #2

Initial Volume

Final Volume

990 ml

2.0 ml

C11-C22 Aromatics

Extractable TPHC Ranges

CAS No. Compound Result RL **MDL** Units Q

53.5

C11-C22 Aromatics (Unadj.) 100 29 55.3 ug/l **IB C9-C18 Aliphatics** 17 ND 100 ug/l C19-C36 Aliphatics ND 100 27 ug/l

100

29

CAS No. Surrogate Recoveries Run#1 Run#2 Limits

84-15-1 o-Terphenyl 83% 40-140% 321-60-8 2-Fluorobiphenyl 85% 40-140% 3386-33-2 1-Chlorooctadecane 59% 40-140% 580-13-2 2-Bromonaphthalene 83% 40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: FB121516

Lab Sample ID:

MC49206-3

Matrix: Method:

AQ - Field Blank Water

Project:

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16

Date Received: 12/20/16

Percent Solids: n/a

File ID **Analytical Batch** DF Analyzed By Prep Date Prep Batch Run #1 WX78447.D 1 12/23/16 AF n/a n/a GWX3885

Run #2

Purge Volume

2,3,4-Trifluorotoluene

Run #1 5.0 ml

Run #2

Volatile TPHC Ranges

CAS No. Compound RL Result MDL Units Q C5- C8 Aliphatics (Unadj.) ND 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) ND 50 8.0 ug/l C9- C10 Aromatics (Unadj.) 50 9.7 JB 10.5 ug/l C5- C8 Aliphatics ND 50 8.8 ug/l C9- C12 Aliphatics ND 50 8.0 ug/l

91%

CAS No. Surrogate Recoveries Run#1 Run#2 Limits 2,3,4-Trifluorotoluene 78%

70-130% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Page 1 of 1

SGS Accutest LabLink@170819 09:23 05-Jan-2017

Report of Analysis

By

TA

Client Sample ID: FB121516

Lab Sample ID: MC49206-3

Matrix: Method: AQ - Field Blank Water

MADEP EPH REV 1.1 SW846 3510C

Date Received: 12/20/16

Date Sampled: 12/15/16

Percent Solids: n/a

Project: BMSMC, Building 5 Area, Puerto Rico

File ID Run #1 DE16617.D DF Analyzed 1 01/04/17

Prep Date 12/29/16

Prep Batch OP49337

Analytical Batch GDE925

Run #2

Initial Volume 920 ml

Final Volume 2.0 ml

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	41.2	110	31	ug/l	JB
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	41.2	110	31	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	73%		40-140%
321-60-8	2-Fluorobiphenyl	89%		40-140%
3386-33-2	1-Chlorooctadecane	58%		40-140%
580-13-2	2-Bromonaphthalene	85%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client	Sample ID:	S-31R(2)

Lab Sample ID:

MC49206-4

Date Sampled: 12/16/16 Date Received: 12/20/16

Matrix: Method: AQ - Ground Water MADEP VPH REV 1.1

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1	File ID WX78432.D	DF 1	Analyzed 12/22/16	By AF	Prep Date	Prep Batch n/a	Analytical Batch GWX3885
Run #2	WX78435.D	10	12/22/16	AF	n/a	n/a	GWX3885

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.)	35.2 7660 a	50 500	8.8 80	ug/l ug/l	J
	C9- C10 Aromatics (Unadj.)	59.2	50	9.7	ug/l	В
	C5- C8 Aliphatics	24.2	50	8.8	ug/l	J
	C9- C12 Aliphatics	1890	50	8.0	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limit	ts	

2,3,4-Trifluorotoluene 87% 70-130% 81% 2.3.4-Trifluorotoluene 102% 95% 70-130%

(a) Result is from Run# 2



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-31R(2)

Lab Sample ID: MC49206-4

File ID

Matrix: Method: AO - Ground Water

DF

1

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/16/16 Date Received: 12/20/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/04/17

Prep Batch

Analytical Batch

Run #1 Run #2

Initial Volume

DE16618.D

Final Volume

By

TA

Prep Date 12/29/16

MDL

33

OP49337

GDE925

880 ml

2.0 ml

Run #1 Run #2

84-15-1

321-60-8

3386-33-2

580-13-2

Extractable TPHC Ranges

CAS No. Compound

> C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics

C11-C22 Aromatics

2-Bromonaphthalene

25.1 ND 48.9

Result

52.6

Run#1

19 110 110 31 110 33

Run#2

RL

110

ug/l ug/l

Limits

40-140%

ug/l JB

Units

ug/l

Q

ΙB

CAS No. Surrogate Recoveries

o-Terphenyl 88% 2-Fluorobiphenyl 90% 1-Chlorooctadecane

61% 88% 40-140% 40-140% 40-140%

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ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: S-29R

Lab Sample ID: MC49206-5

Matrix:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/16/16

Date Received: 12/20/16

Percent Solids: n/a

File ID DF Analyzed Prep Date Prep Batch **Analytical Batch** By WX78444.D Run #1 1 12/22/16 AF GWX3885 n/a n/a

Run #2

Method:

Project:

Purge Volume

Run #1 5.0 ml

Run #2

Volatile TPHC Ranges

CAS No. Compound Result RL **MDL** Units Q C5- C8 Aliphatics (Unadj.) 13.9 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) 47.4 50 8.0 ĬΒ ug/l C9- C10 Aromatics (Unadj.) 50 24.7 9.7 ug/l JB C5- C8 Aliphatics 13.9 50 8.8 ug/l J C9- C12 Aliphatics 21.7 50 8.0 ug/l J

CAS No. Surrogate Recoveries Run# 1 Run#2 Limits

> 2,3,4-Trifluorotoluene 82% 70-130% 2,3,4-Trifluorotoluene 96% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: S-29R Lab Sample ID:

MC49206-5

Matrix:

AQ - Ground Water

DF

1

Date Sampled: 12/16/16 Date Received: 12/20/16

MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Q

JB

JB

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1

File ID DE16619.D

Analyzed 01/04/17

Ву Prep Date TA 12/29/16

Prep Batch OP49337

Analytical Batch GDE925

Run #2

Initial Volume Run #1 980 ml

Final Volume 2.0 ml

Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units
	C11-C22 Aromatics (Unadj.)	51.6	100	29	ug/l
	C9-C18 Aliphatics	ND	100	17	ug/l
	C19-C36 Aliphatics	ND	100	28	ug/l
	C11-C22 Aromatics	39.5	100	29	ug/l
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its
84-15-1	o-Terphenyl	64%		40-1	40%
321-60-8	2-Fluorobiphenyl	83%		40-1	40%
3386-33-2	1-Chlorooctadecane	44%		40-1	40%
580-13-2	2-Bromonaphthalene	81%		40-1	40%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound



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Report of Analysis

Page 1 of 1

Client Sample ID: S-30

Lab Sample ID:

MC49206-6

AQ - Ground Water

Date Sampled: 12/16/16

Matrix: Method:

MADEP VPH REV 1.1

Percent Solids: n/a

Date Received: 12/20/16

Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1

File ID DF WX78445.D 1

Analyzed 12/23/16

By AF

RL

50

50

50

50

50

Prep Date n/a

Prep Batch n/a

Analytical Batch GWX3885

Run #2

Purge Volume

Run #1

5.0 ml

Run #2

CAS No.

Volatile TPHC Ranges

CAS No. Compound

> C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.)

C5- C8 Aliphatics C9- C12 Aliphatics

ND Run#1

Result

12.4

20.7

13.9

ND

Run#2

Limits

MDL

8.8

8.0

9.7

8.8

8.0

Units

ug/l

ug/I

ug/l

ug/l

ug/l

Q

ΙB

JB

2,3,4-Trifluorotoluene 2,3,4-Trifluorotoluene

Surrogate Recoveries

79% 94% 70-130% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: S-30

Lab Sample ID:

MC49206-6

Matrix:

Method:

AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/16/16 Date Received: 12/20/16

Percent Solids: n/a

Project: BMSMC, Building 5 Area, Puerto Rico Analyzed

File ID DE16620.D Run #1 Run #2

DF 1 01/04/17 Ву Prep Date TA 12/29/16

Prep Batch OP49337

Analytical Batch GDE925

Run #1

Initial Volume Final Volume 920 ml 2.0 ml

Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	59.1	110	31	ug/l	JB
	C9-C18 Aliphatics	18.8	110	18	ug/l	J
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	58.7	110	31	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		40-140%
321-60-8	2-Fluorobiphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	62%		40-140%
580-13-2	2-Bromonaphthalene	80%		40-140%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-38

Lab Sample ID:

MC49206-7

Matrix:

AQ - Ground Water

MADEP VPH REV 1.1

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/16/16

Date Received: 12/20/16

Percent Solids: n/a

File ID DF Analyzed Prep Date Prep Batch **Analytical Batch** By Run #1 WX78443.D 1 12/22/16 GWX3885 AF n/a n/a

Run #2

Purge Volume 5.0 ml

Run #1

Run #2

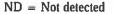
Volatile TPHC Ranges

CAS No. Compound Result RL MDL Units Q C5- C8 Aliphatics (Unadj.) ND 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) ND 50 8.0 ug/l C9- C10 Aromatics (Unadj.) 12.0 50 9.7 ug/l JB C5- C8 Aliphatics ND 50 8.8 ug/l C9- C12 Aliphatics ND 50 8.0 ug/l

CAS No. Surrogate Recoveries Run# 1 Run#2 Limits

2,3,4-Trifluorotoluene 80% 70-130% 2,3,4-Trifluorotoluene 93% 70-130%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-38

Lab Sample ID:

MC49206-7

AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/16/16

Percent Solids: n/a

Date Received: 12/20/16

Method: Project:

Matrix:

BMSMC, Building 5 Area, Puerto Rico

01/04/17

File ID Analyzed

Run #1 DE16621.D Run #2

DF 1

Ву TA

Prep Date Prep Batch 12/29/16 OP49337

Units

ug/l

Q

JB

JB

Analytical Batch GDE925

Initial Volume

980 ml

Final Volume 2.0 ml

Run #1

Run #2

Extractable TPHC Ranges

CAS No. Compound Result RL MDL C11-C22 Aromatics (Unadj.) 41.3 100 29 C9-C18 Aliphatics

ND 100 17 ug/l C19-C36 Aliphatics ND 100 28 ug/l C11-C22 Aromatics 41.3 100 29 ug/l

CAS No. Surrogate Recoveries Run# 1 Run#2 Limits

o-Terphenyl 84-15-1 100% 40-140% 321-60-8 2-Fluorobiphenyl 90% 40-140% 3386-33-2 1-Chlorooctadecane 63% 40-140% 580-13-2 2-Bromonaphthalene 89% 40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page I of 1

Client Sample ID: MW-11 Lab Sample ID:

MC49206-8

Matrix: Method: Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/16/16

Date Received: 12/20/16

Percent Solids:

Prep Batch File ID DF **Analytical Batch** Analyzed By Prep Date Run #1 WX78446.D 1 12/23/16 AF n/a n/a GWX3885

Run #2

Purge Volume

Run #1 Run #2 5.0 ml

Volatile TPHC Ranges

CAS No. Compound Result RL **MDL** Units Q C5- C8 Aliphatics (Unadj.) 9.9 50 8.8 ug/l I C9- C12 Aliphatics (Unadj.) 9.4 50 8.0 ug/l JB C9- C10 Aromatics (Unadj.) 11.1 50 9.7 ug/l JB C5- C8 Aliphatics 9.4 50 8.8 ug/l J C9- C12 Aliphatics ND 50 8.0 ug/l

CAS No. Surrogate Recoveries Run#1 Run#2 Limits

> 2,3,4-Trifluorotoluene 79% 70-130% 2.3,4-Trifluorotoluene 92% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Ву

TA

Prep Date

12/29/16

Page 1 of 1

Client Sample ID: MW-11 Lab Sample ID:

MC49206-8

Matrix:

AQ - Ground Water

DF

1

Date Sampled: 12/16/16

Method:

MADEP EPH REV 1.1 SW846 3510C

Date Received: 12/20/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/04/17

OP49337

Prep Batch

Analytical Batch GDE925

Run #1 Run #2

DE16623.D

File ID

Initial Volume Final Volume

Run #1

910 ml 2.0 ml

Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	41.0	110	31	ug/l	JB
	C9-C18 Aliphatics	ND	110	18	ug/l	_
	C19-C36 Aliphatics	ND	110	30	ug/l	
	C11-C22 Aromatics	41.0	110	31	ug/I	JB
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
84-15-1	o-Terphenyl	91%		40-1	40%	
321-60-8	2-Fluorobiphenyl	87%		40-1	40%	
3386-33-2	1-Chlorooctadecane	70%		40-1	40%	
580-13-2	2-Bromonaphthalene	87%		40-1	40%	- 1





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: EB121616

Lab Sample ID:

MC49206-9

Matrix: Method: AQ - Equipment Blank

DF

1

MADEP VPH REV 1.1

Date Sampled: 12/16/16 Date Received: 12/20/16

Ву

AF

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/21/16

Prep Batch n/a

Q

JB

JB

Analytical Batch GWX3884

Run #1 Run #2

Purge Volume

WX78414.D

File ID

Run #1 5.0 ml

Run #2

CAS No.

Volatile TPHC Ranges

CAS No. Compound

C5- C8 Aliphatics (Unadj.) ND

8.9

13.6

ND

ND

Result

50 50

RL

8.8 8.0

MDL

Prep Date

n/a

ug/l ug/l ug/l

Units

ug/l

ug/l

50 9.7 50 8.8

50 8.0 Run#2

Limits

2,3,4-Trifluorotoluene 2,3,4-Trifluorotoluene

Surrogate Recoveries

C9- C12 Aliphatics (Unadj.)

C9- C10 Aromatics (Unadj.)

C5- C8 Aliphatics

C9- C12 Aliphatics

83% 90%

Run#1

70-130% 70-130%

Méndez IC # 188

ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: EB121616 Lab Sample ID:

MC49206-9 AQ - Equipment Blank Date Sampled: 12/16/16 Date Received: 12/20/16

Matrix: Method:

MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Prep Batch **Analytical Batch**

Run #1

DE16624.D

File ID

Analyzed 01/04/17

By Prep Date TA 12/29/16

OP49337

GDE925

Run #2

Initial Volume 920 ml

Final Volume 2.0 ml

DF

1

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	42.7	110	31	ug/l	JB
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	42.7	110	31	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	93%		40-140%
321-60-8	2-Fluorobiphenyl	93%		40-140%
3386-33-2	I-Chlorooctadecane	58%		40-140%
580-13-2	2-Bromonaphthalene	93%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Ву

AF

Page 1 of 1

Client Sample ID: FB121616

Lab Sample ID:

MC49206-10

Matrix: Method: AO - Field Blank Water

DF

1

Prep Date

Limits

n/a

Date Sampled: 12/16/16 Date Received: 12/20/16

Analyzed

12/21/16

MADEP VPH REV 1.1

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

n/a

Prep Batch **Analytical Batch**

GWX3884

Run #1 Run #2

File ID

5.0 ml

Purge Volume

WX78415.D

Run #1

Run #2

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics	ND ND 11.9 ND	50 50 50 50	8.8 8.0 9.7 8.8	ug/l ug/l ug/l ug/l	JВ
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No. Surrogate Recoveries Run#1 Run#2

> 2,3,4-Trifluorotoluene 85% 70-130% 2,3,4-Trifluorotoluene 92% 70-130%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Clie	nt Sa	mpl	e ID:
Lab	Sam	nle I	D:

FB121616

MC49206-10 AQ - Field Blank Water Date Sampled: 12/16/16 Date Received: 12/20/16

Matrix: Method:

MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

File ID Run #1 DE16625.D Analyzed Ву 01/04/17 TA Prep Date Prep Batch 12/29/16 OP49337

Analytical Batch GDE925

Run #2

Initial Volume Run #1 960 ml

Final Volume 2.0 ml

DF

1

Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics	42.2 ND	100 100	30 17	ug/l ug/l	JB
	C19-C36 Aliphatics C11-C22 Aromatics	ND 42.2	100 100	28 30	ug/l ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	95%		40-140%
321-60-8	2-Fluorobiphenyl	92%		40-140%
3386-33-2	1-Chlorooctadecane	45%		40-140%
580-13-2	2-Bromonaphthalene	93%		40-140%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

By

AF

Page 1 of 1

Client Sample ID: EB121916

Lab Sample ID:

MC49206-11

Matrix:

AQ - Equipment Blank

DF

1

Date Sampled: 12/19/16

Date Received: 12/20/16

Method:

MADEP VPH REV 1.1

Percent Solids: n/a

n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/21/16

Prep Batch

Analytical Batch GWX3884

Run #1 Run #2

Purge Volume

WX78416.D

Run #1

5.0 ml

File ID

Run #2

CAS No.

Volatile TPHC Ranges

CAS No. Compound Result RL MDL Units Q

> C5- C8 Aliphatics (Unadj.) ND 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) ND 50 8.0 ug/l C9- C10 Aromatics (Unadj.) 10.2 50 9.7 JΒ ug/l

C5- C8 Aliphatics ND C9- C12 Aliphatics ND

Surrogate Recoveries

Run#1 Run#2 Limits

50

50

2.3.4-Trifluorotoluene 84% 2,3,4-Trifluorotoluene 93% 70-130%

70-130%

ug/l

ug/l

Prep Date

n/a

8.8

8.0



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

By

TA

Page 1 of 1

Lab Sample ID:

Client Sample ID: EB121916

MC49206-11

Matrix:

AQ - Equipment Blank

DF

1

MADEP EPH REV 1.1 SW846 3510C

Analyzed

01/04/17

Date Sampled: 12/19/16 Date Received: 12/20/16

Percent Solids: n/a

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Prep Date

12/29/16

Prep Batch

OP49337

Analytical Batch GDE925

Run #1 Run #2

Initial Volume

DE16626.D

Final Volume

970 ml

File ID

2.0 ml

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	41.8	100	30	ug/l	JB
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	41.8	100	30	ug/l	JB
					_	

			0	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		40-140%
321-60-8	2-Fluorobiphenyl	86%		40-140%
3386-33-2	1-Chlorooctadecane	44%		40-140%
580-13-2	2-Bromonaphthalene	88%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: MW-9

Lab Sample ID:

MC49206-12

Matrix:

AQ - Ground Water

MADEP VPH REV 1.1

Date Sampled: 12/19/16

Date Received: 12/20/16

Percent Solids: n/a

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1

File ID DF WX78413.D 1

Analyzed 12/21/16

By AF Prep Date n/a

Prep Batch n/a

Q

JB

Analytical Batch

GWX3884

Run #2

Purge Volume

Run #1 Run #2 5.0 ml

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l
	C9- C12 Aliphatics (Unadj.)	ND	50	8.0	ug/l
	C9- C10 Aromatics (Unadj.)	12.1	50	9.7	ug/l
	C5- C8 Aliphatics	ND	50	8.8	ug/l
	C9- C12 Aliphatics	ND	50	8.0	ug/l
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its
	2,3,4-Trifluorotoluene	82%		70-1	30%
	2,3,4-Trifluorotoluene	91%		70-1	30%
					1



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: MW-9

Lab Sample ID:

MC49206-12

Matrix:

AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/19/16 Date Received: 12/20/16

Percent Solids: n/a

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1

DF 1

Analyzed 01/04/17

By TA Prep Date 12/29/16

Prep Batch OP49337

Analytical Batch

GDE925

Run #2

Initial Volume 960 ml

DE16627.D

File ID

Final Volume 2.0 ml

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	45.0	100	30	ug/l	JB
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/I	
	C11-C22 Aromatics	45.0	100	30	ug/l	JB
CAS No.	Surrogate Recoveries	Run#1	Run#	2 Lim	its	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	93%		40-140%
321-60-8	2-Fluorobiphenyl	89%		40-140%
3386-33-2	1-Chlorooctadecane	43%		40-140%
580-13-2	2-Bromonaphthalene	90%		40-140%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: MW-5

Lab Sample ID:

MC49206-13

Matrix:

AO - Ground Water

By

AF

Date Sampled: 12/19/16 Date Received: 12/20/16

Method:

MADEP VPH REV 1.1

DF

1

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/22/16

Prep Date

n/a

Prep Batch n/a

Analytical Batch GWX3885

Run #1 Run #2

Purge Volume

WX78440.D

Run #1 Run #2

5.0 ml

File ID

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	30.4	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	93.3	50	8.0	ug/l	В
	C9- C10 Aromatics (Unadj.)	23.8	50	9.7	ug/l	JB
	C5- C8 Aliphatics	24.2	50	8.8	ug/l	j
	C9- C12 Aliphatics	26.2	50	8.0	ug/l	J
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	

2,3,4-Trifluorotoluene 81% 70-130% 2,3,4-Trifluorotoluene 70-130% 94%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

By

TA

Page 1 of 1

Client Sample ID: MW-5

Lab Sample ID: Matrix:

MC49206-13

File ID

AQ - Ground Water

DF

1

Date Sampled: 12/19/16

Method:

MADEP EPH REV 1.1 SW846 3510C

Date Received: 12/20/16 Percent Solids: n/a

Prep Date

12/29/16

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/04/17

Prep Batch OP49337

Analytical Batch **GDE925**

Run #1 Run #2

Initial Volume

DE16628.D

Final Volume

Run #1

960 ml 2.0 ml

Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	60.7	100	30	ug/l	JB
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	58.6	100	30	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		40-140%
321-60-8	2-Fluorobiphenyl	91%		40-140%
3386-33-2	1-Chlorooctadecane	44%		40-140%
580-13-2	2-Bromonaphthalene	92%		40-140%





MDL = Method Detection Limit



E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: MC49206

Account:

AMANYWP Anderson Mulholland and Assoc.

Project:

BMSMC, Building 5 Area, Puerto Rico

Sample MC49206-4MS MC49206-4MSD MC49206-4	File ID WX78433.D WX78434.D WX78432.D	DF 1 1	Analyzed 12/22/16 12/22/16 12/22/16	By AF AF AF	Prep Date n/a n/a n/a	Prep Batch n/a n/a n/a	Analytical Batch GWX3885 GWX3885 GWX3885
MC49206-4	WX78435.D	10	12/22/16	AF	n/a	n/a	GWX3885

The QC reported here applies to the following samples:

Method: MADEP VPH REV 1.1

MC49206-1, MC49206-2, MC49206-3, MC49206-4, MC49206-5, MC49206-6, MC49206-7, MC49206-8, MC49206-13

CAS No.	Compound	MC492 ug/l	06-4 Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.)	35.2 7660 ^b 59.2	J B	300 450 150	375 12400 166	114 1180* ³ 71	300 450 150	377 11900 170	114 1590* ³ 74	1 4 2	70-130/25 70-130/25 70-130/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49206-4	MC49206-4	Limits
	2,3,4-Trifluorotoluene	86%	86%	87%	81%	70-130%
	2,3,4-Trifluorotoluene	101%	100%	102%	95%	70-130%

(a) Outside control limits due to high level in sample relative to spike amount.

(b) Result is from Run #2.



^{* =} Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: MC49206

Account:

AMANYWP Anderson Mulholland and Assoc.

Project:

BMSMC, Building 5 Area, Puerto Rico

Sample	File ID	DF	Analyzed	Ву	Prep Date	Prep Batch	Analytical Batcl
OP49337-MS	DE16613.D	1	01/04/17	TA	12/29/16	OP49337	GDE925
OP49337-MSD	DE16614.D	1	01/04/17	TA	12/29/16	OP49337	GDE925
MC49206-4	DE16618.D	1	01/04/17	TA	12/29/16	OP49337	GDE925
							*
		-	02/02/21		15/ 50/ 10	01 1000.	02200

The QC reported here applies to the following samples:

Method: MADEP EPH REV 1.1

Page 1 of 1

MC49206-1, MC49206-2, MC49206-3, MC49206-4, MC49206-5, MC49206-6, MC49206-7, MC49206-8, MC49206-9, MC49206-10, MC49206-11, MC49206-12, MC49206-13

		MC49206-4		Spike	MS	MS	Spike	MSD	MSD		Limits	
CAS No.	Compound	ug/l	Q	ug/l	ug/l	%	ug/l	ug/l	%	RPD	Rec/RPD	
	C11-C22 Aromatics (Unadj.)	52.6	JВ	889	720	75	833	758	85	5	40-140/25	
	C9-C18 Aliphatics	25.1	J	333	173	44	312	204	57	16	40-140/25	
	C19-C36 Aliphatics	ND	-	444	345	78	417	496	119	36* a	40-140/25	

CAS No.	Surrogate Recoveries	MS	MSD	MC49206-4	Limits
84-15-1	o-Terphenyl	76%	86%	88%	40-140%
321-60-8	2-Fluorobiphenyl	90%	89%	90%	40-140%
3386-33-2	1-Chlorooctadecane	44%	41%	61%	40-140%
580-13-2	2-Bromonaphthalene	90%	89%	88%	40-140%

(a) High RPD due to possible matrix interference and/or sample non-homogeneity.



^{* =} Outside of Control Limits.



CHAIN OF CUSTODY

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MC49206: Chain of Custody Page 1 of 4



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MC49206: Chain of Custody

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EXECUTIVE NARRATIVE

SDG No: MC49206 Laboratory: Accutest, Massachusetts

Analysis: MADEP VPH Number of Samples: 15

Location: BMSMC, Building 5 Area

Humacao, PR

SUMMARY: Fifth teen (15) samples were analyzed for Volatiles TPHC Ranges by method MADEP

VPH. Samples were validated following the METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the

primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: None Major: None Minor: None

Critical findings: None Major findings: None

Minor findings: 1. Continuing and final calibration verification meets method specific requirements except

in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification was outside the method

performance criteria. Results are qualified as estimated in affected samples.

2. Target analytes detected in the method and field/equipment blanks. Laboratory qualified positive results below the reporting limit with a B qualifier. Sample results below the reporting limit are qualified as non-detects (U). Results above the reporting limits are

retained.

 $\bf 3.~MS/MSD~\%$ recovery within the laboratory control limits except for the cases described in the Data Review Worksheet. No action taken, recovery criteria apply to the unspiked

sample. Unspiked sample from another job.

MS/MSD % recovery and RPD outside laboratory control limits in sample MC49206-4 for C9-C12 Aliphatics (Unadj.). No action taken; % recoveries outside control limits due to

high level in sample relative to the amount spiked.

COMMENTS: Results are valid and can be used for decision making purposes.

Rafuel Infant

Reviewers Name: Rafael Infante

Chemist License 1888

Signature:

Date: January 22, 2017

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49206-1

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	20.7	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	9.1	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	10.7	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	20.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49206-2

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	41.0	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	50.1	ug/L	1	В	-	Yes
Ç9 - C10 Aromatics (Unadj.)	27.6	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	29.3	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	21.9	ug/L	1	J	J	Yes

Sample ID: MC49206-3

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016

Matrix: AQ - Field Blank Water

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C10 Aromatics (Unadj.)	10.5	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49206-4

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	35.2	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	7660	ug/L	10	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	59.2	ug/L	1	В	-	Yes
Ç5 - C8 Aliphatics	24.2	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	1890	ug/L	1	-	-	Yes

Sample ID: MC49206-5

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	13.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	47.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	24.7	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	13.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	21.7	ug/L	1	J	J	Yes

Sample ID: MC49206-6

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	12.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	20.7	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	13.9	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C10 Aromatics (Unadj.)	12.0	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49206-8

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	9.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	9.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	11.1	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	9.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016

Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	8.9	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	13.6	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49206-10

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016

Matrix: AQ _ Field Blank Water

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C10 Aromatics (Unadj.)	11.9	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016

Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C10 Aromatics (Unadj.)	10.2	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49206-12

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C10 Aromatics (Unadj.)	12.1	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	30.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	93.3	ug/L	1	В	-	Yes
Ç9 - C10 Aromatics (Unadj.)	23.8	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	24.2	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	26.2	ug/L	1	J	J	Yes

Sample ID: MC49206-4MS

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	375	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	12400	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	166	ug/L	1	-	-	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	377	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	11900	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	170	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation	Full:X	Project Number:_MC49206
	Limited:	Date: 12/15-19/2016 12/10/10
		Shipping date:12/19/2016 EPA Region: 2
		LFA Region2
REVIEW OF	VOLATILE PETROLE	UM HYDROCARBON (VPHs) PACKAGE
actions. This docume informed decision and assessed according to METHOD FOR THE I Massachusetts Depart validation guidelines p	nt will assist the review in better serving the last the data validation guided DETERMINATION OF Nament of Environmental promulgated by the US dation actions listed on	organics were created to delineate required validation wer in using professional judgment to make more needs of the data users. The sample results were ance documents in the following order of precedence /OLATILE PETROLEUM HYDROCARBONS (VPH), Protection, Revision 1.1 (2004). Also the general EPA Hazardous Wastes Support Section. The QC the data review worksheets are from the primary
The hardcopied (lab received has been rev review for SVOCs included)	riewed and the quality of	test_Laboratories data package control and performance data summarized. The data
No. of Samples: Field blank No.: Equipment blank No.: _	15 MC49206-3;_MC492 MC49206-9;_MC492	Sample matrix:Groundwater
X Data CompleX Holding TimeN/A GC/MS TuninN/A Internal StandX BlanksX Surrogate ReX Matrix Spike/	es ig dard Performance	X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits
Overall _Volatiles_by_GC_by_	Method_MADEP_VPH,_	_REV_1.1
<u> </u>		
Definition of Qualifiers:		
J- Estimated resu	ilte	
U- Compound not		
R- Rejected data		
UJ- Estimated none Reviewer:	detect defaut	
Date:January_2	22,_2017_	

		Criteria wer	All criteria were metx re not met and/or see below
I. DA	ATA COMPLETNE Data Packag		
MISSING	INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
B. Ot	her		Discrepancies:
75 N-2			

All criteria were met	_X
Criteria were not met and/or see below	

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples ana		nod recommende		ample preservation
		<u>'</u>		

Criteria

Preservation:

Samples analyzed with ambient purge temperature: Samples must be acidified to a pH of 2.0 or less at the time of collection.

Samples analyzed with heated purge temperature: Samples must be treated to a pH of 11.0 or greater at the time of collection.

Methanol preservation of soil/sediment samples is mandatory. Methanol (purge-and-trap grade) must be added to the sample vial before or immediately after sample collection. In lieu of the in-field preservation of samples with methanol, soil samples may be obtained in specially-designed air tight sampling devices, provided that the samples are extruded and preserved in methanol within 48 hours of collection.

Holding times:

Aqueous samples using ambient or heated purge - analyze within 14 days. Soil/sediment samples - analysis within 28 days.

Cooler temperature (Criteria: 4 ± 2 °C): 4.8°C	
--	--

Actions: Qualify positive results/non-detects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).

If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R).

If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

		C	All crite riteria were not met and	ria were metX l/or see below
CALIBRAT	IONS VERIFIC	ATION		
			rument calibration are d maintaining acceptabl	
		Date of in	nitial calibration:10/3	31/16
20		Dates of	initial calibration verifica	ation:10/31/16_
		Instrume	nt ID numbers:	_GCWX
		Matrix/Le	vel:AQUEOUS/N	IEDIUM
DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED

Initial and initial calibration verification meet method specific requirements

Criteria-ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range
 of interest. Calculate the collective CFs for C5-C8 Aliphatic Hydrocarbons and C9C12 Aliphatic Hydrocarbons using the FID chromatogram. Calculate the collective
 CF for the C9-C10 Aromatic Hydrocarbons using the PID chromatogram. Tabulate
 the summation of the peak areas of all components in that fraction against the total
 concentration injected. The %RSD of the calibration factor must be equal to or less
 than 25% over the working range for the hydrocarbon range of interest.

Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples, and at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and

DATA REVIEW WORKSHEETS

percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects. If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:	10/31/16
Dates of continuing calibra	tion verification:12/21/16;_12/22/16
Dates of final calibration ve	erification:_10/31/16;_12/22/16;_12/23/16_
Instrument ID numbers:	GCWX
Matrix/Level:	_AQUEOUS/MEDIUM

DATE	LAB FILE	ANALYTE	CRITERIA OUT	SAMPLES
	ID#		RFs, %RSD, <u>%D</u> , r	AFFECTED
12/21/16	cc3857-50	rt5.5/7	31.2 %	MC49206-1 to ; -15;
12/22/16	cc3857-50	rt5.5/7	28.3 %	-4MS/-4MSD
			28.9 %	Ī
			28.9 %	
12/23/16	cc3857-50	rt5.5/7	31.8 %	Ĩ

Note: Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification outside the method performance criteria. Results are qualified as estimated in affected samples.

A separate worksheet should be filled for each initial curve

All criteria were met	
Criteria were not met and/or see below _	X

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_METHOD_BLA				ERIA_EXCEPT_IN_THE
12/21/160	SWX3884-MB	_Aqueous/low_		cs_(Unadj.)11.4_ug/L ics_(Unadj.)12.2_ug/L
_12/22/16G	WX3885-MB	_Aqueous/low_	_C9-C12_Aliphation	cs_(Unadj.)12.9_ug/L cs_(Unadj.)12.8_ug/L

Note: Laboratory qualified positive results below the reporting limit with a B qualifier. Sample results below the reporting limits are qualified as non-detects (U); results above the reporting limits are retained.

Field/Trip/**Equipment**

A methanol trip blank or acidified reagent water trip blank **should** continually accompany each soil/sediment sample or water sample batch, respectively, during sampling, storage, and analysis.

ANALYZED	LAB ID	MATRIX	COMPOUND	UNITS
_ANALYTES_DE	TECTED_IN	_FIELD/EQU _THE_REP(ORTING_LIMITS_E	KAGE _ANALYZED_AT_A XCEPT_FOR_THE_CASES
_12/23/16M	C49206-3 <i>P</i>	.queous/low	C9-C10_Aroma	tics_(Unadj.)10ug/L

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS	
_12/21/16	_MC49206-9_	_Aqueous/low		atics_(Unadj.)8.9_ug/L_ natics_(Unadj.)13.6_ug/L_	
12/21/16 _12/21/16			_ C9-C10_Aroma	atics_(Unadj.)10.6_ug/L_ atics_(Unadj.)10.2_ug/L_ atics_(Unadj.)10.2_ug/L_	

Note: Sample results below the reporting limits are qualified as non-detects (U); results above the reporting limits are retained.

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but < AL, report the compound as not detected (U) at the reported concentration.

If the concentration is > AL, report the concentration unqualified.

CAMDIEID

All criteria were met _	_X
Criteria were not met and/or see below	

ACTION

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery. Matrix: solid/aqueous

CURROCATE COMPOUND

SAMPLE ID	2,3,4-Trifluorotoluene			ACTION	
_SURROGATE_STANDARD_RECOVERIES_WITHIN_LABORATORY_CONTROL_LIMITS					
		78.398020-110			
	L 70_to_130_	to	to		
QC Limits* (Solid		to	to		

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 70% or more than 130%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
- (2) Percent moisture of associated soil/sediment sample is >25% and surrogate recovery is >10%; or
- (3) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met	<
Criteria were not met and/or see below	

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- Matrix duplicate Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 70 130% of the true value. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range), but must be noted in the narrative if <30%.</p>

MS/MSD Recoveries and Precision Criteria

Sample ID:_M	1C49206	-4_MS	MSD_			Matrix	x/Level:_	Ground	lwater_	
List the %Rs, RPD of the compounds which do not meet the QC criteria.										
The QC reported	here appli	es to th	e followir	ng sample	es:		Method:	MADEP	VPH RE	V 1.1
MC49206-1, MC MC49206-13						206-5,	MC49206	-6, MC4	19206-7,	MC49206-8,
	MC49206	6-4	Spike	MS	MS	Spike	MSD	MSD		Limits
Compound	ug/l	Q	ug/l	ug/l	%	ug/l	ug/l	%	RPD	Rec/RPD
C9-C12 Aliphatics (Unadj.)7660 b		450	12400	1180* a	450	11900	1590* a	4	70-130/25

- (a) Outside control limits due to high level in sample relative to spike amount.
- (b) Result is from Run #2.

Note: MS/MSD % recovery and RPD within laboratory control limits except for the cases described in this document. No action taken; % recoveries outside control limits due to high level in sample relative to the amount spiked.

DATA REVIEW WORKSHEETS

Sample ID:	Sample ID:_MC49195-2_MS/MSD					Matrix/Level:_Groundwater				
The QC reported here applies to the following samples: MC49206-9, MC49206-10, MC49206-11, MC49206-12					Method: MADEP VPH REV 1.1				EV 1.1	
Compound	MC491 ug/l	95-2 Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
C9-C10 Aromatics (Unadi.)	15.4		150	116	67* a	150	117	68* a	1	70-130/25

⁽a) Outside control limits due to possible matrix interference.

Note: MS/MSD % recovery outside the laboratory control limits. No action taken, recovery criteria apply to the unspiked sample. Unspiked sample from another job.

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRAT SAMPLE	ION MS	MSD	%RPD	ACTION
		-			4000
Sellin Selle					

Criteria: None specified, use %RSD ≤ 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J). If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

^{* =} Outside of Control Limits.

All criteria were met _	_X
Criteria were not met and/or see below	

VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION	
LCS_RE	COVERY_WITHIN_L	ABORATORY	_CONTROL_LIM	TS	

Criteria:

- * Refer to QAPP for specific criteria.
- * The spike recovery must be between 70% and 130%. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range). If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative.

Actions:

Actions on LCS recovery should be based on both the number of compounds that are outside the %R criteria and the magnitude of the excedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.

If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.

If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? Yes or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

		c	All crite		e metN/A ee below					
IX. FIELD/LAE	X. FIELD/LABORATORY DUPLICATE PRECISION									
Sample IDs: Matrix:										
Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.										
COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION					
No field/laboratory duplicate analyzed with this data package. MS/MSD % recovery RPD used to assess precision. RPD within laboratory and validation guidance document criteria (± 50 %) for analytes detected above reporting limits.										
			ct-specific information							
RPD \pm 30% for aq	ueous san	nples, RPD <u>+</u> 50 %	for solid samples if r	esults a	ıre ≥ SQL.					

If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is $\geq 5x$ the SQL qualify (J/UJ).

Note: If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

All criteria were met _	X
Criteria were not met and/or see below	

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

- 1. Verify that the target analytes were within the retention time windows.
 - Retention time windows must be re-established for each Target VPH
 Analyte each time a new GC column is installed, and must be verified and/or
 adjusted on a daily basis.
 - o Coelution of the m- and p- xylene isomers is permissible.
 - All surrogates must be adequately resolved from individual Target Analytes included in the VPH Component Standard.
 - o For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
 - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

Note: Target analytes were within the retention time window.

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.

				criteria were metX t and/or see below				
XII.	QUANTITATION LIMITS AND SAMPLE RESULTS							
The sa	mple qua	ntitation evaluation i	s to verify laboratory quantitati	on results.				
1.	In the sp	ace below, please s	now a minimum of one sample	calculation:				
MC492	206-1		VPH (C9 – C12 Aliphatics)	RF = 2.125 x 10 ⁴				
FID								
[]=(2	23682)/(2	.125 x 10⁴)						
[]=10).53 ppb	Ok						
MC492	206-1		VPH (C9 – C10 Aromatics)	RF = 7.865 x 10 ³				
PID								
[]=(8	4202)/(7.8	365 x 10 ³)						
[]=10	0.71 ppb	Ok						

- 2. If requested, verify that the results were above the laboratory method detection limit (MDLs).
- 3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
MC49206-4	10 x	C9 – C12 aliphatics over the calibration range.

If dilution was not performed and the results were above the concentration range, ex	stimate
results (J) for the affected compounds. List the affected samples/compounds:	

EXECUTIVE NARRATIVE

SDG No: MC49206 Laboratory: Accutest, Massachusetts

Analysis: MADEP EPH Number of Samples: 15

Location: BMSMC, Building 5 Area

Humacao, PR

SUMMARY: Fifteen (15) samples were analyzed for Extractable TPHC Ranges by method MADEP

EPH. Samples were validated following the METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (EPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: None
Major: None
Minor: None
Critical findings: None
Major findings: None

Minor findings:

- 1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for EPH in the C11-C22 (Aromatics) retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.
- 2. Target analytes detected in the method blank at a concentration below the reporting limits. Laboratory qualified the positive results with a B qualifier. Target analytes detected below the reporting limits are qualified as non-detects (U). Sample results above the reporting limits are retained.
- **3.** Target analytes detected in the field/equipment blank at a concentration below the reporting limits. Target analytes found in corresponding method blank. Laboratory qualified the positive results with a B qualifier. Target analytes detected below the reporting limits are qualified as non-detects (U). Sample results above the reporting limits are retained.
- **4**. C9-C18 aliphatics LCS/LCS % recovery RPD within laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.
- **5.** MS/MSD and RPD within laboratory control limits except for the cases described in the Data Review Worksheet. No action taken, professional judgment. No qualification made based on RPD results.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: Rafael Infante

Chemist License 1888

Signature:

Date: January 22, 2017

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49206-1

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016 Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	47.6	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	47.6	ug/L	1	JB	U	Yes

Sample ID: MC49206-2

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016 Matrix: Groundwater

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	55.3	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	53.5	ug/L	1	JB	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/15/2016

Matrix: AQ - Field Blank Water

METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.2	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	41.2	ug/L	1	JB	U	Yes

Sample ID: MC49206-4

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	52.6	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	25.1	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	48.9	ug/L	1	JB	U	Yes

Sample ID: MC49206-5

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	51.6	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
C11 - C22 Aromatics	39.5	ug/L	1	JB	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	59.1	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	18.8	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	-	Yes
C11 - C22 Aromatics	58.7	ug/L	1	JB	U	Yes

Sample ID: MC49206-7

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.3	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	41.3	ug/L	1	JB	U	Yes

Sample ID: MC49206-8

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.0	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	41.0	ug/L	1	JB	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016

Matrix: AQ - Equipment Blank

METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	42.7	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
C11 - C22 Aromatics	427	ug/L	1	JB	U	Yes

Sample ID: MC49206-10

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016

Matrix: AQ - Field Blank Water

METHOD: MADEP EPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable	
Ç11 - C22 Aromatics (Unadj.)	42.2	ug/L	1	JB	U	Yes	
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes	
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes	
C11 - C22 Aromatics	42.2	ug/L	1	JB	U	Yes	

Sample ID: MC49206-11

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016

Matrix: AQ - Equipment Blank

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.8	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
C11 - C22 Aromatics	41.8	ug/L	1	JB	U	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	45.0	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
C11 - C22 Aromatics	45.0	ug/L	1	JB	U	Yes

Sample ID: MC49206-13

Sample location: BMSMC Building 5 Area

Sampling date: 12/14/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	60.7	ug/L	1	JB	U	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
C11 - C22 Aromatics	58.6	ug/L	1	JB	U	Yes

Sample ID: MC49206-4MS

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

Analyte Name	Result	Units Dil	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	889	ug/L	1	-	-	Yes
Ç9 - C18 Aliphatics	333	ug/L	1	-	-	Yes
C19 - C36 Aliphatics	444	ug/L	1	_	_	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/16/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	758	ug/L	1	-	-	Yes
Ç9 - C18 Aliphatics	204	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	496	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation	Full:X Limited:	Project Number:_MC49206
REVIEW OF EXT	RACTABLE PETROL	EUM HYDROCARBON (EPHs) PACKAGE
validation actions. This more informed decisio were assessed accord precedence METHOD HYDROCARBONS (VI (2004). Also the gene Support Section. The Common control of the control	document will assist the n and in better serving ling to the data validation FOR THE DETER PH), Massachusetts Dep ral validation guidelines	cile organics were created to delineate required be reviewer in using professional judgment to make the needs of the data users. The sample results on guidance documents in the following order of MINATION OF EXTRACTABLE PETROLEUM partment of Environmental Protection, Revision 1.1 promulgated by the USEPA Hazardous Wastes dation actions listed on the data review worksheets is otherwise noted.
The hardcopied (laboreceived has been review for SVOCs included)	iewed and the quality co	st_Laboratories data package ntrol and performance data summarized. The data
No. of Samples: Field blank No.: Equipment blank No.: _	_MC49206-3;_MC49206 _MC49206-9;_MC49206	Sample matrix:Groundwater
X Data CompleX Holding TimeN/A GC/MS TuninN/A Internal StandX BlanksX Surrogate ReX Matrix Spike/	es ng dard Performance ecoveries	X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits
Overall _Extractable_Petroleur	n_Hydrocarbons_by_G0 	Comments: C_by_Method_MADEP_EPH,_REV_1.1
Definition of Qualifiers:		
J- Estimated results Compound not Rejected data UJ- Estimated none	ults t detected	
Reviewer: January 22	2,_2017	

		All criteria were metx net and/or see below
I. DATA COMPLETNE A. Data Packag		
MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
		270
B. Other		Discrepancies:

All criteria were metX
Criteria were not met and/or see below

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples	extracted and an	alyzed within me	thod recommend	ed holding time

<u>Criteria</u>

Preservation:

Aqueous samples must be acidified to a pH of 2.0 or less at the time of collection.

Soil samples must be cooled at 4 ± 2 °C immediately after collection.

Holding times:

Samples must be extracted within 14 days of collection, and analyzed within 40 days of extraction.

Cooler temperature	(Criteria:	4 + 2 °C\·	4.8°C	

Actions: Qualify positive results/nondetects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ). If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R). If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

		Crite	All criteria eria were not met and/o	a were metX or see below
CALIBRAT	IONS VERIFIC	ATION		
	at the instrum		nstrument calibration producing and mai	
Dat	e of initial calib	ration:12/06	5/16	
Dat	es of initial cali	bration verification:_	12/06/16	
Inst	rument ID num	bers:GCD	E	
Mat	rix/Level:	_AQUEOUS/MEDIUI	VI	
DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
	nitial and conti	nuing calibration me	et method specific req	uirements
•				

Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be
 equal to or less than 25% over the working range for the analyte of interest.
 When this condition is met, linearity through the origin may be assumed, and the
 average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C9-C18 Aliphatic Hydrocarbons, C19-C36 Aliphatic Hydrocarbons, and C11-C22 Aromatic Hydrocarbons using the FID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.
 - The area for the surrogates must be subtracted from the area summation of the range in which they elute.
 - o The areas associated with naphthalene and 2-methylnaphthalene in the aliphatic range standard must be subtracted from the uncorrected collective C9-C18 Aliphatic Hydrocarbon range area prior to calculating the CF.

Criteria- CCAL

 At a minimum, the working calibration factor must be verified on each working day, after every 20 samples or every 24 hours (whichever is more frequent), and

DATA REVIEW WORKSHEETS

- at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects.

If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:12/06/16
Dates of continuing calibration verification:01/03/17
Dates of final calibration verification:_12/06/16;_01/04/17
Instrument ID numbers: GCDE
Matrix/Level:_SOIL/AQUEOUS/MEDIUM

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, <u>%D,</u> r	SAMPLES AFFECTED
	aitial and contin	uing calibration meets	method specific red	uirements
		luing calibration meets	method specific red	direments.

Note:

A separate worksheet should be filled for each initial curve

All criteria were met	
Criteria were not met and/or see below	Χ

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB II		EVEL/ ATRIX	COMPOU	ND	CONCENTRATION UNITS	
_METHOD _THE_CASE						CRITERIA_EXCEPT_FO	R_ -
_01/04/17	_OP49337-I	MBAQ	/LOW_	C11-C22_/	Aromatics_(L	Jnadj.)_33.8_ug/l	_

Note: The laboratory qualified positive results for affected sample with a B. Results below the reporting limit are qualified as non-detects (U). Results above the reporting limit are retained.

Field/Trip/Equipment

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_FOR_THIS_D	ATA_PACKAG			IPMENT_BLANK_ANALYZED_ DESCRIBED_IN_THIS
_	C49206-3	_AQ/LOW		cs_(Unadj.)41.2_ug/l
01/04/17M	C49206-10	_AQ/LOW _AQ/LOW	C11-C22_Aromati	cs_(Unadj.)42.7_ug/l cs_(Unadj.)42.2_ug/l
_01/04/17M	C49206-11	_AQ/LOW	C11-C22_Aromati	cs_(Unadj.)41.8_ug/l

Note: Detected analyte found in laboratory method blank. The laboratory qualified positive results for affected sample with a B. Results below the reporting limit are qualified as non-detects (U). Results above the reporting limit are retained.

All criteria were met _	_X	_
Criteria were not met and/or see below		

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but < AL, report the compound as not detected (U) at the reported concentration.

If the concentration is > AL, report the concentration unqualified.

All criteria were met	X
Criteria were not met and/or see below	

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery. Matrix: solid/aqueous

SAMPLE ID	SURROGA S1	ATE COMPOUI S2	ND S3	S4	ACTION
SURROGATE _LIMITS	STANDARE	S_RECOVER	ES_WITHIN_L	ABORATOR	Y_CONTROL
Note:					
S1 = o-Terpheny S3 = 1-Chlorooct			S2 = 2-Fluorol S4 = 2-Bromo		
QC Limits (%)* (A_LL_to_UL4 QC Limits* (Solid	0_to_140_	_40_to_140_	_40_to_140_	_40_to_140)_
_LL_to_UL_	_to	to	to	to	

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 40% or more than 140%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
- (2) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met _X	
Criteria were not met and/or see below	

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- Matrix duplicate Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 40 140% of the true value. Lower recoveries of n-nonane are permissible but must be noted in the narrative if <30%.</p>

MS/MSD Recove	eries and Precision Cr	iteria			
Sample ID:_MC4	49206-4_MS/MSD		Matrix/L	evel:Grour	ndwater
List the %Rs, RF	PD of the compounds v	which do not	meet the	QC criteria.	
MS OR MSD	COMPOUND	% R	RPD (QC LIMITS	ACTION
					
MS/MSD	C19C39		36%_	25	No_action
<u></u>					

Note: MS/MSD and RPD within laboratory control limits except for the cases

qualification made based on RPD results.

described in this document. No action taken, professional judgment. No

9

All criteria were metX	
Criteria were not met and/or see below	

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD - Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRATION SAMPLE	ON MS	MSD	%RPD	ACTION
		-		0.1009-9	
					

Criteria: None specified, use %RSD ≤ 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J). If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

		All criteria were metX Criteria were not met and/or see below
	VIII.	LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS
matrice		ata is generated to determine accuracy of the analytical method for various
	1.	LCS Recoveries Criteria
		List the %R of compounds which do not meet the criteria
LCS IE)	COMPOUND % R QC LIMIT ACTION
_LCS/I _THE_	LCSD_I _CASES	RECOVERY_WITHIN_LABORATORY_CONTROL_LIMTS_EXCET_FOR_ S_DESCRIBED_IN_THIS_DOCUMENT
	Note:	C9-C18 aliphatics LCS/LCS % recovery RPD within laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.
	Criteria	
	*	Refer to QAPP for specific criteria. The spike recovery must be between 40% and 140%. Lower recoveries of n-nonane are permissible. If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative. RPD between LCS/LCSD must be < 25%.
		s on LCS recovery should be based on both the number of compounds e outside the %R and RPD criteria and the magnitude of the excedance of
the ass If the s for the If more qualify	sociated %R of to affecte than h	he analyte is > UL, qualify all positive results (j) for the affected analyte in d samples and accept nondetects. he analyte is < LL, qualify all positive results (j) and reject (R) nondetects d analyte in the associated samples. Half the compounds in the LCS are not within the required recovery criteria, itive results as (J) and reject nondetects (R) for all target analyte(s) in the mples.
2.	Freque	ency Criteria:
per ma If no, t the eff	atrix)? <u>Y</u> he data ect and	nalyzed at the required frequency and for each matrix (1 per 20 samples sets or No. a may be affected. Use professional judgment to determine the severity of qualify data accordingly. Discuss any actions below and list the samples uss the actions below:

		Crite	All criteria eria were not met and		netN/A below
IX. FIELD/LAE	BORATOR'	Y DUPLICATE PR	ECISION		
Sample IDs:			Matrix:		
overall precision. results may have laboratory perform	These ana more va nance. It is er matrice:	alyses measure bo riability than labo also expected tha	taken and analyzed oth field and lab pre- oratory duplicates w t soil duplicate result s associated with co	cision; 1 hich m ts will h	therefore, the easures only ave a greater
COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
	recision. R	PD within laborator	data package. MS/M ry and generally acce bed in this document	eptable	
Criteria:					
RPD + 30% for ac	lueous san	nples, RPD <u>+</u> 50 %	ct-specific information for solid samples if the RPD criteria is double	results a	are <u>≥</u> SQL.
SQL = soil quantit	ation limit				
Actions:					
If both the samp calculable (NC). N			s are nondetects (N	ID), the	RPD is not
Qualify as estimatexceeded the abo	•	re results (J) and	nondetects (UJ) for	the co	empound that
If one sample resu	ult is not de	tected and the oth	er is \geq 5x the SQL qu	ualify (J	'UJ).

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

Note: If SQLs for the sample and duplicate are significantly different, use professional

judgment to determine if qualification is appropriate.

All criteria were met	X
Criteria were not met and/or see below	

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

- 1. Verify that the target analytes were within the retention time windows.
 - o Retention time windows must be re-established for each Target EPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
 - o The n-nonane (n-C9) peak must be adequately resolved from the solvent front of the chromatographic run.
 - o All surrogates must be adequately resolved from the Aliphatic Hydrocarbon and Aromatic Hydrocarbon standards.
 - o For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
 - o The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.
- 1a. Aliphatic hydrocarbons range:
 - o Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for n-C9 and 0.01 minutes before the Rt for n-C19.
 - o Determine the total area count for all peaks eluting 0.01 minutes before the Rt for n-C19 and 0.1 minutes after the Rt for n-C36.

Are the aliphatic hydrocarbons range properly determined?

Yes? or No?

Comments:

- 1b. Aromatic hydrocarbons range:
 - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for naphthalene and 0.1 minutes after the Rt for benzo(g,h,i)perylene.
 - Determine the peak area count for the sample surrogate (OTP) and fractionation surrogate(s). Subtract these values from the collective area count value.

Are the aliphatic hydrocarbons range properly determined?

Yes? or No?

Comments:

Comments: Not applicable.

		Criteria were not		re metX e below
2.	If target analytes and laboratory resubmit the	l/or TICs were not correctly corrected data.	identified, re	quest that the
3.	evaluated for potential % recovery of the fractions basis by quantifying national and aromatic fractions naphthalene or 2-met the total concentrations.	nation - Each sample (field breakthrough on a sample spationation surrogate (2-bromogaphthalene and 2-methylnaple of the LCS and LCSD. If of hylnaphthalene in the aliphon for naphthalene or 2-methylnaphthalene	pecific basis by naphthalene) and thalene in both either the corration ethylnaphthale	evaluating the and on a batch the aliphation occurration oexceeds 5% one in the LCS
	r s a	The total concentration methylnaphthalene in the Loummation of the concentiphatic fraction and the concentration fraction.	CS/LCSD pair	r includes the ected in the
		ration_in_the_aliphatic_fractionhthalene_and_2-methylnaph		
4.	containing 14 alkanes each constituent. The Infractionation efficiency optimum hexane volument allowing significant contained in the fractions.	Standard – A fractionation and 17 PAHs at a nominal of ractionation Check Solution of each new lot of silica gelete required to efficiently elute the aromatic hydrocarbon bread on the contion check solution, exclusive and 40 and 140%. A 30% is	concentration of must be used to cartridges, and aliphatic hydro akthrough. For uding n-nonan	of 200 ng/µl o to evaluate the d establish the ocarbons while each analyte e, the Percen
	Is a fractionation check	standard analyzed?	,	Yes? or No?

All criteria were met	X
Criteria were not met and/or see below	

XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

In order to demonstrate the absence of aliphatic mass discrimination, the response ratio of C28 to C20 must be at least 0.85. If <0.85, this nonconformance must be noted in the laboratory case narrative.

The chromatograms of Continuing Calibration Standards for aromatics must be reviewed to ensure that there are no obvious signs of mass discrimination.

Is aliphatic mass discrimination observed in the sample?

Yes? or No?

Is aromatic mass discrimination observed in the sample?

Yes? or No?

1. In the space below, please show a minimum of one sample calculation:

MC49206-1

EPH (C11 – C22, Aromatics)

RF = 99940

[] = (2282092)/(99940)

[] = 22.83 ppb Ok

EPH (C19 - C36, Aliphatics)

RF = 67800

[] = (673969)/(67800)

[] = 9.94 ppb Ok

DATA REVIEW WORKSHEETS

- 2. If requested, verify that the results were above the laboratory method detection limit (MDLs).
- 3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION			
	-	1			
		-			
	+				

If dilution was not performed, affected samples/compounds:	results	(J) f	or the	affected	compounds.	List	the
		93.05					